

Collateral damage: could microplastics act as a vector for PCBs through the marine ecosystem?

Devriese Lisa, Bavo De Witte, Karen Bekaert, Mattias Bossaer, Kevin Vanhalst, Hannelore Theetaert, and Johan Robbens

Institute for Agricultural and Fisheries Research (ILVO), Marine Environment and Quality, Ankerstraat 1, B-8400 Oostende, Belgium
E-mail: lisa.devriese@ilvo.vlaanderen.be

Plastic items, floating or drifting through the marine environment, act as ‘mini sponges’ for all kinds of chemicals including toxic products of high concern (Gauquie *et al.* 2015). Collateral damage, caused by these toxic chemicals, might occur after ingestion of plastic items and microplastics. The main question addressed here is the potential of microplastics to act as a vector for chemicals such as persistent environmental pollutants or plastic related additives. In this specific study, the potential role of microplastics as a vector for polychlorinated biphenyls (PCBs) is investigated through the marine ecosystem. The ingestion of microplastics may provide an additional biomagnification route for plastic-adsorbed contaminants or may counteract biomagnification by sorption of contaminants from the tissues of the marine organisms on the plastic.

An impact study at controlled laboratory conditions in which Norwegian lobster (*Nephrops norvegicus*) is exposed to PCB-loaded microplastics will be presented. Murray & Cowie (2011) already showed that *Nephrops* are able to consume microplastics. In the proposed lab experiments 500–600µm diameter polyethylene or polystyrene spheres and 6µm polystyrene spheres were loaded with the 7 ICES indicator PCBs next to 3 non-environmental PCBs. After 3 weeks of exposure, the PCB levels in the tissues of the tested *Nephrops* were analyzed using a Bligh and Dyer extraction followed by GC-ECD quantification.

Spheres of 500–600µm are expected to pass the digestive tract without accumulation in the organisms, while 6µm spheres might reside for a longer period into the gut. Although the guts of the Norway lobsters are discarded before human consumption, the presence of chemicals leached out from the plastic into the tail flesh could be a potential health concern. Within this study, it is investigated whether the period the plastic spheres reside in the intestinal tract is sufficient to release or adsorb PCBs. The exposure experiments revealed only a small uptake of these chemicals by Norwegian lobster. This could indicate that strongly adsorbed chemicals are not easily released from the plastic, even during passage through the digestive tract.

References

- Gauquie J., L. Devriese, J. Robbens and B. De Witte. 2015. Plastic: a source or sink for pollutants? Qualitative screening and quantitative measurements on different types of marine debris, Marine Pollution Bulletin. (submitted).
- Murray F. and P.R. Cowie. 2011. Plastic contamination in the decapods crustacean *Nephrops norvegicus* (Linnaeus, 1758). Marine Pollution Bulletin 62(2):1207–1217.